

# Advanced Aqueous Phase Catalyst Development using Combinatorial Methods, Phase II

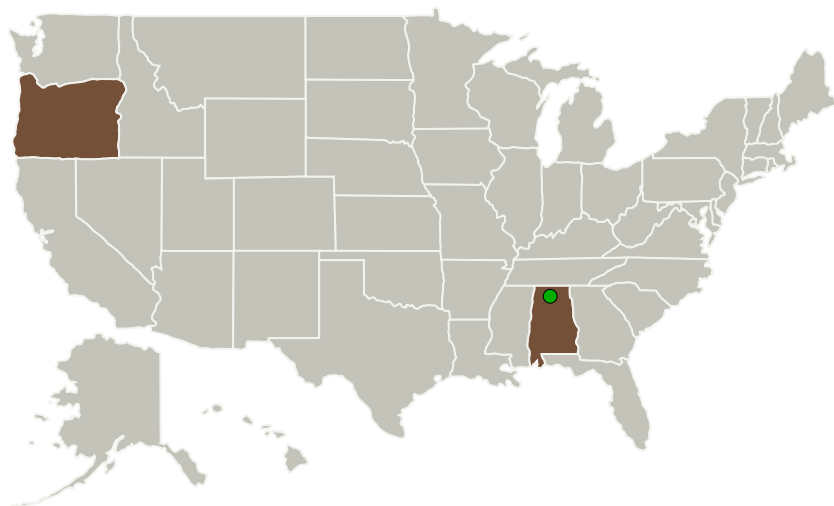
Completed Technology Project (2011 - 2013)



## Project Introduction

Combinatorial methods are proposed to develop advanced Aqueous Oxidation Catalysts (AOCs) with the capability to mineralize organic contaminants present in effluents from current and future primary wastewater treatment processes at temperatures less than 70°C, pressures below 20 psig, and contact times under 30 minutes. The Phase II effort will build upon the successful Phase I feasibility demonstration and identify rate-limiting factors for contaminant oxidation identified in the best Phase I AOCs. A new series of combinatorial catalysts will be prepared with the goal to systematically improve catalyst performance. Improvements will focus on contaminant and reaction byproduct adsorption, mass transfer resistances, and reaction rate limitations associated with noble metal concentration, dispersion, and support interaction. A second-generation combinatorial library with 102 AOCs will be prepared based on this analysis. Oxidation activity will then be compared using a difficult to oxidize ersatz solution containing contaminants known to occur in the current U.S. water processor aboard the ISS. These tests will select the best AOC based upon analysis of oxidation kinetics. This AOC will undergo long-term testing to verify performance. Scale-up activities will follow, resulting in a full-scale, deliverable prototype. The advanced AOC will lower water processor ESM and provide multiple commercial opportunities.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
UMPQUA Research Company	Lead Organization	Industry	Myrtle Creek, Oregon
● Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Oregon

## Project Transitions

**June 2011:** Project Start**May 2013:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/138662>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

UMPQUA Research Company

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

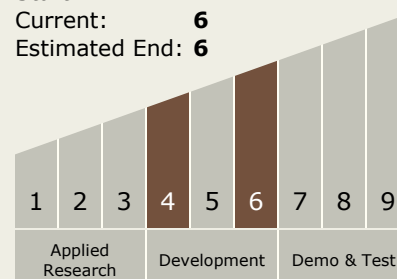
Carlos Torrez

**Principal Investigator:**

James R Akse

## Technology Maturity (TRL)

Start: 4  
 Current: 6  
 Estimated End: 6



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## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - └ TX06.1.2 Water Recovery and Management

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System